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Ekkehard Pott

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NORRIS, MCLAUGHLIN & MARCUS, P.A.
875 THIRD AVE
18TH FLOOR
NEW YORK, NY 10022

EXAMINER

NGUYEN, TU MINH

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

1. An Applicant's Amendment filed on April 2, 2009 has been entered. Claims 37-53 have been amended and are pending in this application.

Specification

2. The abstract of the disclosure is objected to because of the use of open ended phrase "comprising" on line 1. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 37-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (U.S. Patent 5,802,845).

Re claim 37 and 38, as shown in Figure 5, Abe et al. disclose an internal combustion engine installation having a gasoline engine (ENGINE) (see lines 30-33 of column 4) and a catalyst system which is downstream from the gasoline engine and has at least one catalyst (Catalyst A), wherein the catalyst system (Catalyst A) has a total catalyst volume (KV) of less than 0.8 x the engine displacement (VH) (see lines 61-65 of column 9), and that the average

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specific noble metal loading of the at least one catalyst of the catalyst system is less than 3.59 g/dm³ (lines 44-45 of column 5), the total mass of noble metal of the catalyst system being less than 2 g per liter of engine displacement (VH).

Abe et al., however, fail to disclose that the engine installation is a directly injected gasoline type engine which is adapted for operating in a stratified manner only to a small extent in terms of all operation points of the direct injected gasoline engine.

Abe et al. disclose the claimed invention except for applying the invention to a directly injected gasoline type engine adapted for operating in a slightly stratified manner only. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Abe et al. to a directly injected gasoline type engine, since the recitation of such amounts to an intended use statement. Note that both “directly injected gasoline engine” and “carburetor gasoline engine” generate exhaust gases containing harmful emissions of HC, NO_x, soot, CO, etc, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification system of Abe et al. for use in a directly injected gasoline engine would be well within the level of ordinary skill in the art.

Re claim 39, since the engine of Abe et al. has a catalyst substantially the same size as that of the pending application, it is obvious that in the engine installation of Abe et al., the catalyst system has a catalyst volume (KV) of less than 1.15 L per 100 kW of rated horsepower (PNENN) and especially of less than 1.00 L per 100 kW.

Re claim 40, as shown in Figure 8, in the engine installation of Abe et al., the catalyst system consists of at least two main catalysts (Catalyst B and Catalyst C), arranged in parallel with at least one pre-catalyst (EHC).

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Re claim 41, in the engine installation of Abe et al., the average specific noble metal loading of the at least one catalyst (Catalyst A) of the catalyst system is especially not more than 2.15 g/dm^3 (see lines 44-45 of column 5).

Re claims 42 and 47, in the engine installation of Abe et al., the pre-catalyst or pre-catalysts (EHC) have a specific noble metal loading, which is higher by up to 70%, especially by up to 50% and preferably by up to 30% than that of the main catalyst (Catalyst A) (see lines 23-49 of column 13 and lines 44-45 of column 5).

Re claim 43, in the engine installation of Abe et al., the total mass of noble metal of the catalyst system is less than 1.6 g per liter of engine displacement (VH) of the gasoline engine, especially less than 1.2 g per liter of engine displacement, preferably at less than 1.0 g per liter of engine displacement and, particularly preferably, less than 0.8 g per liter of engine displacement.

Re claim 44, in the engine installation of Abe et al., the total mass of noble metal of the catalyst system is less than 3 g per 100 kW of rated horsepower of the gasoline engine, particularly less than 2.5 g per 100 kW of rated horsepower, preferably less than 2.1 g per 100 kW of rated horsepower and particularly preferably less than 1.7 g per 100 kW of rated horsepower.

Re claim 48, in the engine installation of Abe et al., the catalyst or catalysts of the catalyst system, especially of the at least one catalyst (Catalyst A) are based on a ceramic support (see lines 31-37 of column 5).

Re claim 50, in the engine installation of Abe et al., the at least one pre-catalysts (EHC) has a support based on metal foil (lines 20-23 of column 7).

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Re claim 52, in the engine installation of Abe et al., the gasoline engine (12) is adapted for stratified operation in less than 7% of all operating points, especially in less than 5% of all operating points and preferably in less than 3% of all operating points

Re claim 53, in the engine installation of Abe et al., the gasoline engine is naturally aspirated.

Re claim 45, the engine installation of Abe et al. discloses the invention as cited above, however, fails to disclose that the at least one catalyst (Catalyst A) or the at least one pre-catalyst (EHC) is at a distance of less than 800 millimeter exhaust gas pipeline length from the nearest outlet valve of the gasoline engine, particularly less, than 500 mm of exhaust gas pipeline length and preferably less than 300 mm of exhaust gas pipeline length.

Abe et al. disclose the claimed invention except for specifying an optimum range of distance between the at least one catalyst (Catalyst A) or the at least one pre-catalyst (EHC) and the nearest outlet valve of the engine of less than 300 mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of said distance, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claim 46, the engine installation of Abe et al. discloses the invention as cited above, however, fails to disclose that the at least one pre-catalyst (EHC) and the at least one downstream main catalyst (Catalyst A) are at a distance of more than 100 mm from one another.

Abe et al. disclose the claimed invention except for specifying an optimum range of distance between the at least one downstream catalyst (Catalyst A) and the at least one pre-

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catalyst (EHC) of less than 100 mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of said distance, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claims 49 and 51, in the engine installation of Abe et al., the catalyst or catalysts (Catalyst A) are based on a ceramic support, have a cell density of more than 400 cpsi (see lines 49-53 of column 12); and that the at least one pre-catalyst (EHC) has a cell density of more than 450 cpsi (see lines 37-44 of column 13). Abe et al., however, fail to disclose that the catalyst (Catalyst A) and the pre-catalyst (EHC), each has a cell density of more than 500 cpsi.

Abe et al. disclose the claimed invention except for specifying an optimum range of cell density for the catalyst (Catalyst A) and the at least one pre-catalyst (EHC) of more than 500 cpsi. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of cell density for each of the Catalyst A and the EHC, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

5. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

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In response to applicant's argument that Abe et al. fail to disclose or teach a catalyst system having a total catalyst volume of less than $0.8 \times$ the engine displacement; and that the average specific noble metal loading of the catalyst system is less than 3.59 g/dm^3 (pages 17-18 of Applicant's Amendment), the examiner respectfully disagrees.

The text on lines 61-65 of column 9 in Abe et al. reads as follows: "The volume of the catalyst A is in the range of about 50 to 200% of the displacement of engine. The catalyst A may be constituted of a single honeycomb structure or a plurality of the honeycomb structures." (emphasis added by the examiner). Thus, Abe et al. clearly teach a catalyst system having a total catalyst volume of less than $0.8 \times$ the engine displacement.

The text on lines 44-45 of column 5 in Abe et al. reads as follows: "*The total amount of the supported noble metal in the catalyst is in the range of 20 to 130 g/ft³,*". Therefore, Abe et al. teach a catalyst system having an average specific noble metal loading of the catalyst system is less than 3.59 g/dm^3 .

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/

TMN

Tu M. Nguyen

July 20, 2009

Primary Examiner

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